

Amendments to the Specification:

Page 4, between the 7<sup>th</sup> and 8<sup>th</sup> paragraph add the following

**-- BRIEF DESCRIPTION OF THE DRAWING --**

Figure 1 is a graph showing the results of a direct contact test-kinetic study.

Figure 2 is a graph showing the resistance to the permeation of trichloroethylene by a composite membrane. –

Page 10 is being resubmitted at the request of Examiner Pak because it was not completely legible. No changes have been made to this page.

Page 23, delete the graph and make the graph Figure 1.

Replacement pages 4, 10 and 23, which include these changes, are attached hereto.

Another aspect of the present invention is to provide these formulations for polymers, fibers and fabrics.

Yet another aspect of this present invention is to provide a laminating layer in the composite membrane that would allow water vapor to permeate while completely blocking organic vapors.

Another aspect of this invention is to provide a high surface area for this laminating polymer by cross-linking it on high area substrates such as carbon nanotubes, carbon black or nanophase oxides such as titanium oxide or such.

Another aspect of this present invention is to provide methodologies for incorporating the formulations from this invention in printing inks and shades during the printing of fabrics made from natural and/or synthetic fibers.

Another aspect of this present invention is to provide a finish coating incorporating the formulations from this invention, on a fabric or a surface.

Another aspect of this invention is to provide compositions for use with high area materials such as carbon fabric, felt, carbon blacks, carbon nanotubes and other high area materials for use in masks.

Yet another object of this invention is to provide a "triple defense" system where antimicrobials provide the biocidal actions, the catalytic materials provide chemical deactivation and the laminating layer provides a physical barrier to chemical vapors while allowing moisture.

#### **BRIEF DESCRIPTION OF THE DRAWING**

Figure 1 is a graph showing the results of a direct contact test-kinetic study.

Figure 2 is a graph showing the resistance to the permeation of trichloroethylene by a composite membrane.

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

##### ***Biocidal components (Filler 1)***

The submicron, micron or nanosize silver species are quite reactive toward the active chlorines of the agents and could render them inactive by converting the chlorines into silver chloride. The silver or silver ions are expected to be biocidal to microorganisms. Silver and some of its compounds is well known for its biocidal properties against a broad spectrum of microorganisms and its activity toward the

Table I. Our results on the various surface modifications of elastomers.

Static Diffusion Test Results (conducted at GeoMet Inc., MD)

Sample Identification		Type	Run #	Observed Endpoint (min)
<b>HD SAMPLES</b>				
027-076-01	Butyl	Control	IID Run #1	565
027-076-01	Butyl	Control	IID Run #1	595
027-076-01	Butyl	Control	IID Run #1	625
027-076-02	Butyl, Diesel Exposed	Control	IID Run #1	295
027-076-02	Butyl, Diesel Exposed	Control	IID Run #1	250
027-076-02	Butyl, Diesel Exposed	Control	IID Run #1	385
027-076-03	Natural	Control	IID Run #2	185
027-076-03	Natural	Control	IID Run #2	170
027-076-03	Natural	Control	IID Run #2	170
027-076-04	Neoprene	Control	IID Run #2	180
027-076-04	Neoprene	Control	IID Run #2	130
027-076-04	Neoprene	Control	IID Run #2	150
027-076-05	Nitrile	Control	IID Run #2	120
027-076-05	Nitrile	Control	IID Run #2	125
027-076-05	Nitrile	Control	IID Run #2	120
027-076-06	Silicone	Control	IID Run #2	< 5
027-076-06	Silicone	Control	IID Run #2	< 5
027-076-06	Silicone	Control	IID Run #2	< 5
027-076-14	Natural	FC Coated	IID Run #2	305
027-076-14	Natural	FC Coated	IID Run #2	> 2410
027-076-14	Natural	FC Coated	IID Run #2	> 2410
027-076-15	Neoprene	FC Coated	IID Run #2	400
027-076-15	Neoprene	FC Coated	IID Run #2	290
027-076-15	Neoprene	FC Coated	IID Run #2	290
027-076-16	Nitrile	FC Coated	IID Run #2	230
027-076-16	Nitrile	FC Coated	IID Run #2	260
027-076-16	Nitrile	FC Coated	IID Run #2	2190
027-076-17	Silicone	FC Coated	IID Run #2	55
027-076-17	Silicone	FC Coated	IID Run #2	45
027-076-17	Silicone	FC Coated	IID Run #2	55
027-076-08	Butyl	RF Plasma Treated	IID Run #1	870
027-076-08	Butyl	RF Plasma Treated	IID Run #1	765
027-076-08	Butyl	RF Plasma Treated	IID Run #1	555
027-076-09	Butyl	PVA Coated	IID Run #1	1985
027-076-09	Butyl	PVA Coated	IID Run #1	1870
027-076-09	Butyl	PVA Coated	IID Run #1	1590
027-076-12	Butyl, *Adjacent to IID leak	FC Coated	IID Run #1	555
027-076-12	Butyl, *IID leaked	FC Coated	IID Run #1	375
027-076-12	Butyl	FC Coated	IID Run #1	1590
027-076-13	Butyl	SARC	IID Run #1	870
027-076-13	Butyl	SARC	IID Run #1	840
027-076-13	Butyl	SARC	IID Run #1	760
027-076-10	Butyl, Diesel Exposed **Adj.	PVA Coated	IID Run #1	975
027-076-10	Butyl, Diesel Exposed **L	PVA Coated	IID Run #1	500
027-076-10	Butyl, Diesel Exposed	PVA Coated	IID Run #1	> 2410
027-076-11	Butyl, Diesel Exposed	FC Coated	IID Run #1	850
027-076-11	Butyl, Diesel Exposed **L	FC Coated	IID Run #1	385
027-076-11	Butyl, Diesel Exposed	FC Coated	IID Run #1	365
<b>GB SAMPLES</b>				
027-076-07	Viton	Control	GB Run #1	235
027-076-07	Viton	Control	GB Run #1	235
027-076-07	Viton	Control	GB Run #1	235
027-076-18	Viton	FC Coated	GB Run #1	235
027-076-18	Viton	FC Coated	GB Run #1	235
027-076-18	Viton	FC Coated	GB Run #1	235
027-076-19	Viton	PVA Coated	GB Run #1	825
027-076-19	Viton	PVA Coated	GB Run #1	415
027-076-19	Viton	PVA Coated	GB Run #1	305

FC = fluorocarbon; PVA = polyvinyl alcohol; SARC = silicone abrasion resistant coating. All PVA, SARC and FC coated samples were post treated with RF plasma (air – 100-200 mTorr), medium power, 30 minutes.

Diesel Exposure = Diesel fuel applied with Q-tip. Samples stay in hood 10 minutes. Samples blotted dry and tested immediately.

\* = In IID Run #1, some coated samples were difficult to keep sealed, due to the "slickness" of the coating. Sample ID "027-076-12" had an IID leak around the outside of the sample, generating an artificially shortened endpoint time for this sample and for the adjacent sample.

\*\* = In IID Run #1, the diesel fuel "ate" the wax seal from around the felt washer. This resulted in some samples leaking IID around the outside of the sample, generating an artificially shortened endpoint time for the samples and for some adjacent samples (Adj. = Adjacent to leaking samples; L = Leaking sample).

Note: The samples in IID Run #2 were sealed with duct sealant, which resulted in no leakage during the tests.

#### EXAMPLE 11. Microbiological tests.

##### Log Reduction test:

Purpose: To determine in a quantitative manner the log reduction kill by contacting membrane and fabric as well as membrane-fabric samples with viable spore or bacteria.

##### Procedure

1. Samples were cut into disks the same size as agar plates (diameter=8.6cm, area=58cm<sup>2</sup>).
2. Appropriate dilutions of *Bacillus Subtilis* var. *Niger* spores in 100uL were spread onto tryptic soy agar plates.
3. Samples were placed onto the agar in a sterile manner and in the appropriate orientation.